UNITED STATES PATENT AND TRADEMARK OFFICE

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EXAMINER
PHILLIPS, HASSAN A

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/782,532	Applicant(s) MOULTON ET AL.
	Examiner Hassan Phillips	Art Unit 2151

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2002*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-51* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4,5*.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The Information Disclosure Statements (IDS) filed on October 5, 2001, and February 11, 2002, have been received and considered by the examiner.

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 13, 33, 35, 38-40, and 44, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 13 recites the limitations "the parity group", and "each data element" in line 27. There is insufficient antecedent basis for these limitations in the claim. In order

for the examiner to complete a review of the application for patent, the examiner has interpreted "the parity group" to be "n" in the n-dimensional parity scheme, and "each data element" to be the data to be stored by the plurality of network accessible devices.

4.   Claim 33 recites the limitations "the unit of data" in line 13, and "the two or more storage devices" in line 14. There is insufficient antecedent basis for these limitations in the claim. In order for the examiner to complete the review of the application for patent, the examiner has interpreted "the unit of data" to be "the data", and "the two or more storage devices" to be "the one or more storage devices".

5.   Claim 35 recites the limitation "the unit of data" in line 3. There is insufficient antecedent basis for this limitation in the claim. In order for the examiner to complete the review of the application for patent, the examiner has interpreted "the unit of data" to be "the data".

6.   Claim 38 recites the limitations "the stored unit of data" on page 39, line 2, "the stored unit of data" on page 40, line 1, "the retrieved unit of data" on page 40, line 3, and "the correct unit of data" on page 40, line 4. There is insufficient antecedent basis for these limitations in the claim. In order for the examiner to complete the review of the application for patent, the examiner has interpreted "the stored unit of data" to be "the stored data", "the retrieved unit of data" to be "the retrieved data", and "the correct unit of data" to be "the correct data".

7. Claim 39 recites the limitations "the stored unit of data" in line 2, "the two or more network storage nodes" in line 3, and "the correct unit of data" in line 6. There is insufficient antecedent basis for these limitations in the claim. In order for the examiner to complete the review of the application for patent, the examiner has interpreted "the stored unit of data" to be "the stored data", "the two or more network storage nodes" to be "the one or more network storage devices", and "the correct unit of data" to be "the correct data".

8. Claim 40 recites the limitation "the unit of data" in line 2. There is insufficient antecedent basis for this limitation in the claim. In order for the examiner to complete the review of the application for patent, the examiner has interpreted "the unit of data" to be "the data".

9. Claim 44 recites the limitation "the plurality of storage nodes" in line 11. There is insufficient antecedent basis for this limitation in the claim. In order for the examiner to complete the review of the application for patent, the examiner has interpreted "the plurality of storage nodes" to be "the plurality of network-accessible storage devices".

Claim Objections

1.   When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 50-52 have been renumbered 49-51.

2.   Claim 9 is objected to because of the following informalities: Line 2 has a minor spelling error, "Fibre". The examiner feels the correct spelling of this word should be "Fiber". Appropriate correction is required.

3.   Claim 39 is objected to because of the following informalities: Line 2 has a minor grammatical error, "attempting to retrieving". The examiner feels the proper wording should be "attempting to retrieve". Appropriate correction is required.

4.   Claim 41 is objected to because of the following informalities: Line 1 has a minor grammatical error, "further comprises". The examiner feels the proper wording should be "further comprising". Appropriate correction is required.

5.   Claim 46 is objected to because of the following informalities: Line 4 has a minor spelling error, "fo". The examiner feels the correct spelling of this word should be "of". Appropriate correction is required.

6. Claim 47 is objected to because of the following informalities: Line 1 on page

42 has a minor grammatical error. The examiner feels the word "in" in front of

"preemptively" should be taken out of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102

that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) The invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-28, 42-50, are rejected under 35 U.S.C. 102(e) as being clearly

anticipated by Carter et al. (hereinafter Carter), U.S. patent 5,987,506.

3. In considering claims 1 and 21, Carter discloses a data storage management

system and method comprising:

  a) At least one network-accessible storage device capable of storing data,

     (col. 6, lines 7-12);

  b) A plurality of network-accessible devices configured to implement storage

     management processes, (col. 6, lines 37-43);

c) A communication system enabling the storage management processes to

communicate with each other, wherein the storage management

processes comprise processes for storing data to the at least one

network-accessible device, (col. 7, lines 43-60).

4. In considering claims 2 and 22, the system and method disclosed by Carter

teaches the at least one network-accessible device capable of storing data comprising a

plurality of network-accessible devices capable of storing data, some of which are

located at distinct network nodes. See col. 6, lines 7-12.

5. In considering claims 3 and 23, the system and method disclosed by Carter

teaches the storage management processes comprising processes for serving data

from the at least one network accessible storage device. See col. 7, lines 43-49.

6. In considering claims 4 and 24, the system and method disclosed by Carter

further teaches the at least one storage device comprising a RAID storage system. See

col. 16, lines 43-46.

7. In considering claim 5, the system disclosed by Carter teaches the at least

one storage device comprising a computer with the direct attached storage (DAS) being

any persistent memory. This provides a means for the DAS to be selected from the

group consisting of magnetic hard disk, magneto-optical, optical disk, digital optical

tape, holographic storage, quantum storage, and atomic force probe storage. See col. 16, lines 43-46.

8. In considering claim 6 and 25, the system and method disclosed by Carter further teaches the plurality of storage devices comprising a peer-to-peer network of storage devices, each storage device having means for communicating state information with other storage devices, at least one storage device comprising means for receiving storage requests from external entities, and at least one storage device comprising means for causing read and write operations to be performed on others of the storage devices. See col. 13, lines 19-58.

9. In considering claim 7, the system disclosed by Carter provides a means for the communication system to comprise a TCP/IP over Ethernet network. See col. 3, lines 1-5.

10. In considering claim 8, the system disclosed by Carter provides a means for the communication system to comprise a Gigabit Ethernet network. See col. 3, lines 1-5.

11. In considering claim 9, the system disclosed by Carter provides a means for the communication system to comprise a Fiber Channel fabric. See col. 3, lines 1-5.

12. In considering claim 10, the system disclosed by Carter provides a means for the communication system to comprise a wireless network. See col. 3, lines 1-5.

13. In considering claim 11, the system disclosed by Carter further teaches the processes for storing data comprising processes that implement a RAID-type distribution across the plurality of network-accessible devices. See col. 8, lines 42-50.

14. In considering claim 12, the system disclosed by Carter further teaches the processes for storing data comprising processes that provide a means for implementing an n-dimensional parity scheme across the plurality of network accessible devices. See col. 8, lines 39-50.

15. In considering claim 13, it is inherent that the system of Carter provides a means for expanding or contracting the size of "n" in the n-dimensional parity scheme for the data to be stored by the plurality of network accessible devices to whatever extent is desired. See Carter, col. 8, lines 39-50.

16. In considering claims 14 and 28, the system and method disclosed by Carter further teaches the storage management processes further comprising processes for recovery of data when one or more of the network accessible storage devices is unavailable. See col. 36, lines 10-22.

17. In considering claim 15, the system disclosed by Carter teaches the storage management processes comprising processes that provide a means for accessing stored data when one or more of the network accessible storage devices are not desirable data sources for reasons including efficiency, performance, network congestion, and security. See col. 6, lines 12-14.

18. In considering claim 16, the system disclosed by Carter further provides a means for the plurality of network-accessible devices configured to implement storage management processes to further comprise commercial off-the-shelf computer systems implementing a common operating system. See col. 18, lines 63-67, col. 19, lines 1-4.

19. In considering claim 17, the system disclosed by Carter further provides a means for the plurality of network-accessible devices configured to implement storage management processes to further comprise commercial off-the-shelf computer systems implementing a heterogeneous set of operating systems. See col. 18, lines 63-67, col. 19, lines 1-4.

20. In considering claim 18, it is inherent that the system of Carter provides a means for the storage management processes to comprise processes for implementing greater than two dimensions of parity. See Carter, col. 8, lines 39-50.

21. In considering claims 19 and 27, the system and method disclosed by Carter teaches the processes for storing data comprising processes that provide a means for storing parity and/or mirror data across more than one of the plurality of network accessible storage devices. See col. 8, lines 39-50.

22. In considering claim 20, it is inherent in the system taught by Carter that the storage management processes comprise processes for adding and removing additional storage capacity to individual storage devices and the system as a whole. See col. 9, lines 10-17.

23. In considering claim 26, the method disclosed by Carter provides a means for storing data using a RAID-type distribution across the plurality of network accessible storage devices. See col. 8, lines 39-50.

24. In considering claim 42, Carter discloses a method of data storage management comprising the acts of:

    a) Providing a plurality of network-accessible storage devices capable of storing data, (col. 6, lines 37-43);

    b) Implementing a plurality of storage management process instances to communicate with each other, and to store data to the network-accessible devices (col. 7, lines 43-60);

c) Changing the storage capacity under the control of the storage

management processes without affecting accessibility of the data storage,

(col. 9, lines 10-17).

25. In considering claim 43, the method disclosed by Carter teaches monitoring

the data storage for faults by means of the storage management processes and

compensating for the faults by manipulating the data storage under control of the

storage management processes. See col. 23, lines 12-27.

26. In considering claim 44, Carter discloses a method of data storage

management comprising the acts of:

a) Providing a plurality of network-accessible storage devices capable of

storing data, (col. 6, lines 37-43);

b) Implementing a plurality of storage management process instances to

communicate with each other, (col. 7, lines 43-60);

c) The processes being capable of storage allocation and de-allocation

across the plurality of network-accessible storage devices, (col. 21, lines

32-44).

27. In considering claim 45, the disclosed method of Carter teaches the

processes being configured to use the storage messages to reconstruct data stored in a

failed one of the storage devices. See col. 36, lines 10-63.

28. In considering claim 46, the disclosed method of Carter teaches the storage management processes being configured to migrate data amongst the storage devices using the storage messages in response to a detected fault condition in at least one of the storage devices. See col. 23, lines 12-27.

29. In considering claim 47, the disclosed method of Carter teaches the storage management processes being configured to provide a means for migrating data amongst the storage devices using the storage messages preemptively when a fault condition in at least one of the storage devices is determined to be likely. See col. 23, lines 12-27.

30. In considering claim 48, the disclosed method of Carter teaches the plurality of storage devices comprising an arbitrarily large number of storage devices. See col. 9, lines 10-17.

31. In considering claim 49, the disclosed method of Carter provides a means for associating parity information with a data set, storing the parity information in at least some of the storage devices, and serving data requests corresponding to the data set by accessing the parity information associated with the data set. See col. 23, lines 12-27.

32. In considering claim 50, the disclosed method of Carter teaches storing a data set in a plurality of the data storage devices using the storage management processes. Further, it is inherent in the method disclosed by Carter that data requests corresponding to the data set are accessed from the plurality of data storage devices in parallel. See col. 7, lines 8-38.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 29-41, are rejected under 35 U.S.C. 103(a) as being unpatentable over Carter in view of Litwin et al. (hereinafter Litwin), U.S. patent 6,122,754 (supplied by applicant).

3. In considering claim 29, Carter discloses a data storage management system comprising:

a) A plurality of network-accessible storage devices capable of storing data, (col. 6, lines 7-12);

b) A plurality of network-accessible devices configured to implement storage management processes, (col. 6, lines 37-43);

c) A communication system enabling the storage management processes to

communicate with each other, wherein the storage management

processes comprise processes for storing data to the at least one

network-accessible device, (col. 7, lines 43-60);

d) A method for correcting errors on another network-accessible storage

device, (col. 36, lines 1-8).

Although the disclosed system of Carter shows substantial features of the

claimed invention, it fails to expressly disclose:

a) A parity record holding parity information for at least one other storage

node.

Nevertheless, in a similar field of endeavor, Litwin discloses a method and

system for data recovery comprising:

a) A network-accessible device capable of storing data comprising a parity

record holding parity information for at least one other storage node, (col.

3, lines 18-26).

Given the teachings of Litwin it would have been apparent to one of ordinary skill

to modify the teachings of Carter to have network devices comprise parity records for at

least one other storage node. This would provide a secure means for correcting errors

and recovering data in the network accessible devices, Carter col. 23, lines 16-22. This

also would have provided a fault tolerant method for preserving data transmitted to the

network accessible devices, Litwin, col. 3, lines 51-57.

4. In considering claim 30, the disclosed system of Litwin teaches the parity

record comprising data capable of correcting errors on another network-accessible

storage device. See Litwin, col. 7, lines 56-60. The motivation to combine the

teachings of Carter and Litwin would be the same as that mentioned in consideration of

claim 29.

5. In considering claim 31, the system disclosed by Carter provides a means for

the parity records to be stored in data structures on at least two network-accessible

storage devices. See col. 23, lines 16-20.

6. In considering claim 32, the system disclosed by Carter provides a means for

the data storage system to comprise data structures implementing parity with one or

more other, external data storage systems. See col. 23, lines 16-20.

7. In considering claim 33, Carter discloses a method of data storage

management comprising the act of:

   a) Providing a plurality of network-accessible storage devices capable of

      storing data, (col. 6, lines 7-12);

   b) Implementing a plurality of storage management process instances,

      communicating storage messages between the storage management

      process instances, and identifying one or more storage devices

      associated with the data to be stored, (col. 7, lines 43-60);

c) Storing the data across two or more storage devices, (col. 23, lines 16-

20).

Although the disclosed system of Carter shows substantial features of the

claimed invention, it fails to expressly disclose:

a) Determining parity information for the data to be stored.

Nevertheless, in a similar field of endeavor, Litwin discloses a method and

system for data recovery comprising:

a) Generating parity files for data to be stored on network-accessible

devices, (col. 1, lines 17-20).

Given the teachings of Litwin it would have been apparent to one of ordinary skill

to modify the teachings of Carter to show that parity information is determined for the

data to be stored. This would show that there is a secure means for correcting errors

and recovering data in the network accessible devices. This also would also further

assure that the method disclosed by Carter is a fault tolerant method for preserving data

transmitted to the network accessible devices, Litwin, col. 3, lines 51-57.

8. In considering claim 34, the disclosed system of Litwin teaches the parity

record comprising data capable of correcting errors on another network-accessible

storage device. See Litwin, col. 7, lines 56-60. The motivation to combine the

teachings of Carter and Litwin would be the same as that mentioned in consideration of

claim 33.

9. In considering claim 35, the system disclosed by Carter provides a means for the parity data to comprise a mirror copy of the data to be stored. See col. 23, lines 16-20.

10. In considering claim 36, the system disclosed by Carter provides a means for the parity data to be stored in a single network storage node, and the data to be stored in two or more network storage nodes. See col. 23, lines 16-20.

11. In considering claim 37, the system disclosed by Carter provides a means for the parity data to be distributed across multiple storage nodes. See col. 8, lines 42-50.

12. In considering claim 38, the system disclosed by Carter further teaches:

   a) Retrieving the stored data, (col. 7, lines 43-49).

Although the disclosed system of Carter shows substantial features of the claimed invention, it fails to expressly disclose:

   a) Using parity data after detecting an error in the retrieved data.

Nevertheless, in a similar field of endeavor, Litwin discloses a method and system for data recovery comprising:

   a) Verifying the correctness of the stored data, (col. 3, lines 18-22);

   b) Upon detection of an error in the retrieved data, retrieving the correct data using parity data, (col. 3, lines 22-26).

Given the teachings of Litwin it would have been apparent to one of ordinary skill

to modify the teachings of Carter to verify the correctness of the stored data using parity

data, and upon detecting an error in the retrieved data, retrieving the correct data using

the parity data. This would provide a secure means for correcting errors and recovering

data in the network accessible devices. This also would also provide a fault tolerant

method for preserving data transmitted to the network accessible devices, Litwin, col. 3,

lines 51-57.

13. In considering claim 39, the system disclosed by Carter further teaches:

   a) Attempting to retrieve the stored data, detecting unavailability of one of the

      one or more network storage devices, and in response to detecting

      unavailability, reconstructing the correct data using a reconciliation log,

      (col. 36, lines 10-63).

Although the disclosed system of Carter shows substantial features of the

claimed invention, it fails to expressly disclose:

   a) Reconstructing the data using parity data.

Nevertheless, in a similar field of endeavor, Litwin discloses a method and

system for data recovery comprising:

   a) Reconstructing data in a failed data bucket using parity data, (col. 3, lines

      18-26).

Given the teachings of Litwin it would have been apparent to one of ordinary skill

to modify the teachings of Carter to show reconstructing data in a network storage

device, after detecting the network storage device was unavailable, using parity data.

This would show a secure means for correcting errors and recovering data in the

network accessible devices. This also would also further assure that the method

disclosed by Carter is a fault tolerant method for preserving data transmitted to the

network accessible devices, Litwin, col. 3, lines 51-57.

14. In considering claim 40, the system disclosed by Carter provides a means for

the act of storing data to comprise distributing non-identical but logically equivalent data

in a storage node. See col. 8, lines 42-50.

15. In considering claim 41, the system disclosed by Carter provides a means for

storing lossy equivalent data in a storage node. See col. 8, lines 42-50.

16. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Carter in view of McClain, U.S. patent 5,794,254 (supplied by applicant).

17. In considering claim 51, the disclosed method of Carter further teaches:

    a) Security mechanisms when communicating, (col. 4, lines 38-50).

Although the disclosed system of Carter shows substantial features of the

claimed invention, it fails to expressly disclose:

    a) Encrypting storage messages before communicating.

Nevertheless, encrypting messages before communicating was well known in the art at the time of the present invention. This is exemplified in a similar field of endeavor where McClain discloses a method and system for backing up computer files at a remote site comprising:

a) Encrypting a storage message before communicating, (col. 6, lines 48-53).

Given the teachings of McClain it would have been apparent to one of ordinary skill to modify the teachings of Carter to show encrypting storage messages before communicating. This would provide a secure and safe means for storing data over a network, while preventing the data from being read by unauthorized individuals.

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Carter et al., U.S. patent 5,987,506 discloses a system and method for distributed management of data storage.

Litwin et al., U.S. patent 6,122,754 (supplied by applicant), discloses a system and method for recovering data using parity data.

McClain, U.S. patent 5,794,254 (supplied by applicant), discloses sending an encrypted message when communicating remotely.

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hassan Phillips whose telephone number is (703) 305-8760. The examiner can normally be reached on M-F 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess can be reached on (703) 305-4792. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FRANTZ B. JEAN
PRIMARY EXAMINER

HP/
5/7/04